

PRODUCT INFORMATION

Greenbank Electronics

8K of 2708's - PRM-8 Board DescriptionPrice 50p1. Introduction.

This board replaces the PRM-7. The main difference is the addition of a buffer on the data bus. Although we have had supplies of the board itself, regrettably our supplier has not yet prepared the necessary detailed information to accompany the board. We have drawn our own temporary circuit diagrams etc., and are sending them, in case they will help you in any way.

2. Function.

This board can be used to hold up to 8K of 2708's (1K=1024 8-bit bytes = 1x2708). On board decoding is provided for a 16-bit address bus.

3. Circuit Description.

IC5 decodes the top four address lines ($A_{12}, A_{13}, A_{14}, A_{15}$), and decodes a 16K block of addresses into four 4K blocks (i.e. four 4K 'pages'). Two of the four pages are each decoded further by IC2 into four 1K blocks each, making eight in all. The eight outputs of IC2 are the eight 'chip selects' for the eight 2708 memory devices. Whenever one of the eight 2708 positions is selected, there is a logic '0' at either pin 1 or 15 of IC2, and (via IC3d, IC3c) pin 1 of IC11 is thus also '0'. This 'enables' IC11 (an 8-bit data buffer) so that when NRDS (the 'read data strobe') is also present, the data from the selected 2708 is gated onto the data bus (edge connector pins 22-29).

C1 to C6 provide decoupling for the various supply lines.

4. Address Selection.

This is carried out by links or DIL switches (designated on our diagrams as "IC4" and "IC6", due to the similarity to 8-pin DIL ICs).

Using this notation the following links give the following partial addresses:-

<u>"IC6"</u>				<u>"IC4"</u>			
Link	1 - 8	for	\emptyset XXX	Link	1 - 8	for	\emptyset XXX
<u>or</u>	2 - 7	for	4XXX	<u>or</u>	2 - 7	for	1XXX
<u>or</u>	3 - 6	for	8XXX	<u>AND</u>			
<u>or</u>	4 - 5	for	CXXX	Link	3 - 6	for	2XXX
				<u>or</u>	4 - 5	for	3XXX

(ICs 12-15)

(ICs 7-10)

Example:

Add the partial addresses to obtain the 4K block. e.g. for ICs 12-15 linking 4-5 of "IC6" and linking 3-6 of "IC4" locates ICs 12-15 at

CXXX + 2XXX = EXXX (Because C + 2 = E in hexadecimal notation).

The individual 2708's in the 4K block EXXX in this example are at the following addresses:

IC10: ~~E000~~ - E3FF
 IC9: ~~E400~~ - E7FF
 IC8: ~~E800~~ - EBFF
 IC7: ~~EC00~~ - EFFF

5. Less than 8K.

It is not essential to have all eight 2708's installed, but in the standard arrangement the addresses cannot be used for any other purpose because IC11 will still be enabled at the selected addresses.

If this presents a problem there are various solutions; for example, if it was required to work without IC 7, pin 9 of IC3c could be isolated from pins 10, 11, and connected with a piece of wire to pin 20 of IC 7. Then, whenever IC7 would have been selected, the 'low' on pin 9 of IC3c would force pin 8 'high'. The 'high' thus on pin 1 of IC11 would disable it so that some other device (e.g. 1K of RAM elsewhere) could put its data on the bus without conflict.

6. Separate I/O and Memory Request.

The Z80 (for example) can use the same address bus for memory and separate input/output requests. Such systems will require the PRM-8 card to respond at its address when 'Memory Request' is present and not to respond when 'Memory Request' is absent.

The easiest way of bringing in the Memory Request signal (usually position 2 on the edge connector, brought to pad 'P2' in this design), is to isolate pin 1 of IC5a and connect it to P2.

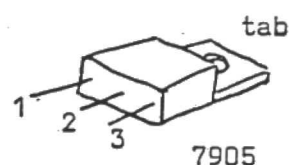
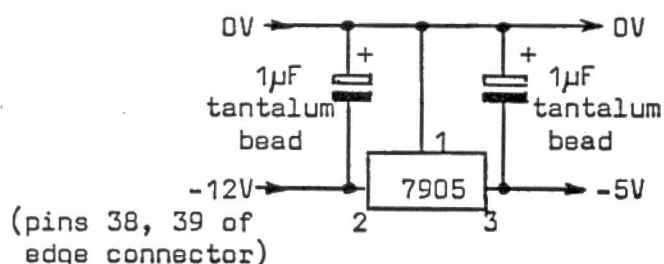
7. 'Page Select'.

Some systems, for reasons of elegance or economy use the 'page select' method of address decoding. Only the lower 12 address lines are used on the address bus, the upper 4 being decoded elsewhere into one or more of the 16 possible 'page selects'. If this is required, "IC4", IC5, "IC6", may all be omitted and the appropriate two 'page selects' (active low) connected directly to pins 1 and 15 respectively of IC2.

8. -12V Power Rail.

In some systems a -5V rail may not be used, but instead -12V may be found on bus positions 38, 39 of the edge connector. In such cases the danger of damage due to a -5V card being plugged into a -12V slot can be prevented by fitting an on board regulator i.c. to take in -12V and convert it to -5V.

The circuit is as follows:



Note! tab is internally connected to pin 2

If the patch area "IC1" is not already being used the above circuit can be built there.

(The tantalum capacitors are used for their good high frequency response, to ensure high frequency stability in the regulator circuit. They should be mounted close to the regulator i.c., say 10 to 20 mm away. If ordinary electrolytic capacitors are used, bypass them with a high frequency ceramic capacitor in parallel with each, value say 100nF.) If more than one or two 2708's are to be used, fit a few square inches of aluminium to the regulator to act as a heat sink/dissipator.

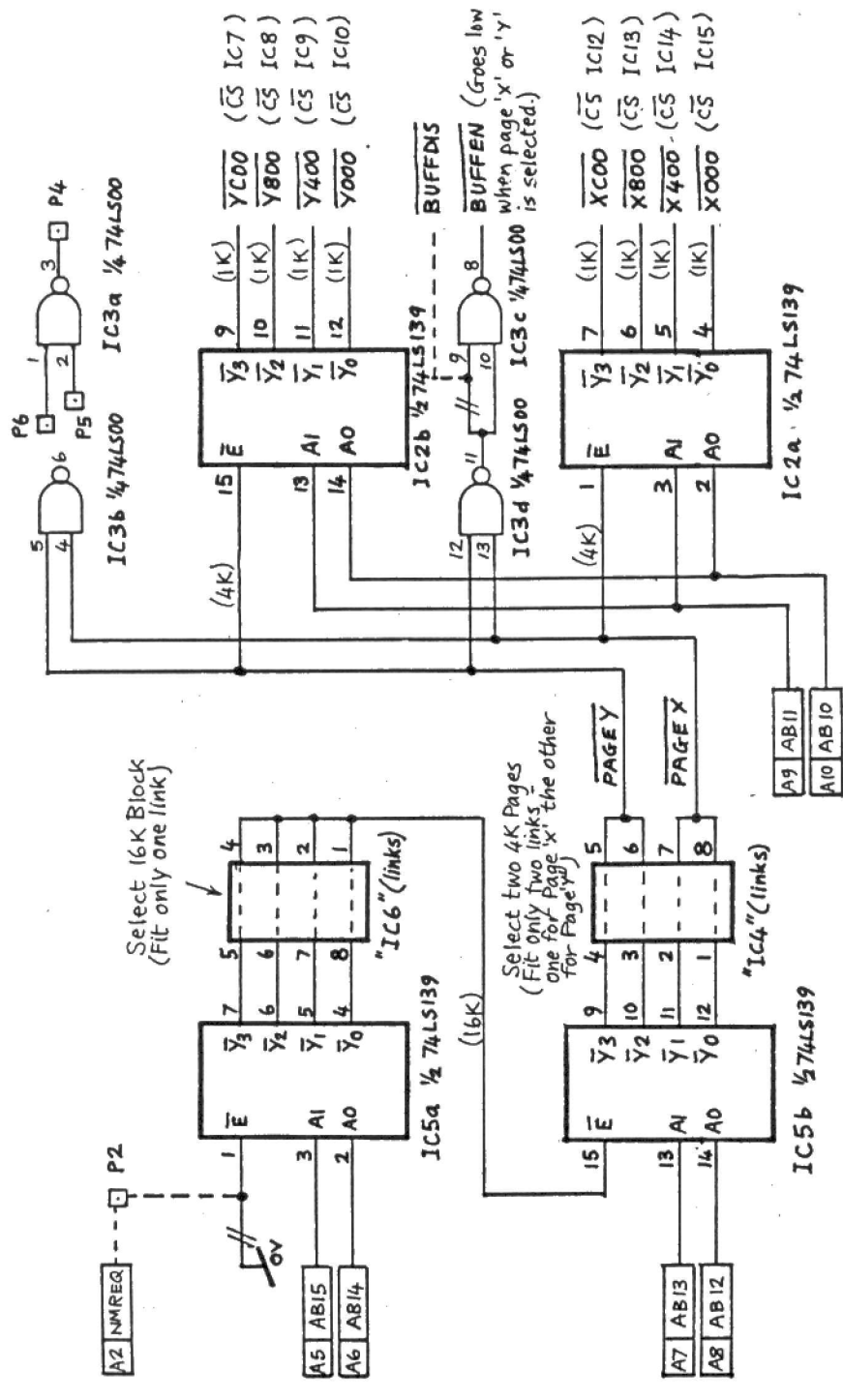
D.M.P. 31/8/79

TABLE OF ADDRESS LINKS FOR GIVEN 4K PAGES 'X' AND 'Y'

PAGE NO.	"IC6" LINK	"IC4" PAGE 'X' LINK	"IC4" PAGE 'Y' LINK
0	1-8	1-7,8	1-5,6
1	1-8	2-7,8	2-5,6
2	1-8	3-7,8	3-5,6
3	1-8	4-7,8	4-5,6
4	2-7	1-7,8	1-5,6
5	2-7	2-7,8	2-5,6
6	2-7	3-7,8	3-5,6
7	2-7	4-7,8	4-5,6
8	3-6	1-7,8	1-5,6
9	3-6	2-7,8	2-5,6
A	3-6	3-7,8	3-5,6
B	3-6	4-7,8	4-5,6
C	4-5	1-7,8	1-5,6
D	4-5	2-7,8	2-5,6
E	4-5	3-7,8	3-5,6
F	4-5	4-7,8	4-5,6

NOTES:

- ① Pages 'x' and 'y' have to be in the same 16K block.
- ② Page 'x' must not equal Page 'y'.
- ③ DIL switches can be used for "IC4" and "IC6", but if "IC4" is a DIL switch it is not possible to set every combination of adjacent pages for 'x' and 'y'.



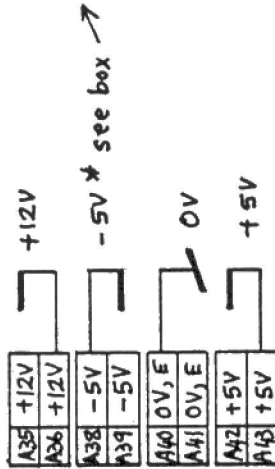
EDGE CONNECTIONS UNUSED BY THIS BOARD:

A1	WIRE	P1
A3	NWDS	P3
A21	NRST	
A30	NENIN	P7
A31	NENWT	P8
A32	NRFH	P9
A33	RCLK	P10
A34	NWAIT	

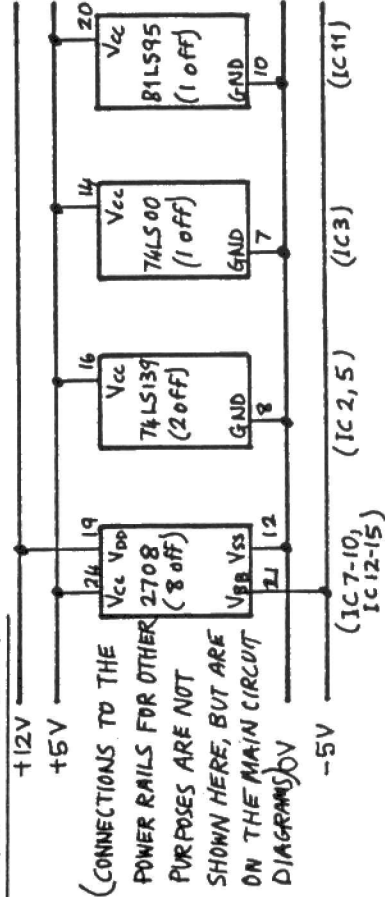
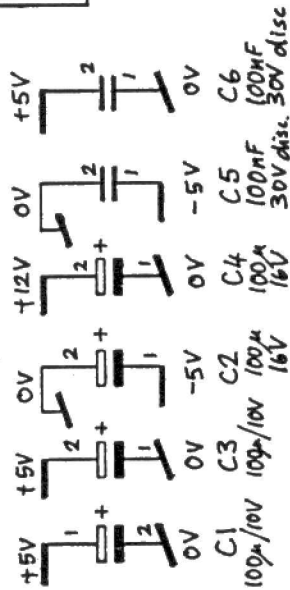
THE WHOLE OF THE 'B' SIDE CONNECTIONS ARE UNUSED AND THERE ARE NO 0.1" 'FINGERS' PROVIDED

POLARISING SLOT (IF USED) SHOULD BE POSITIONS A37, B37

POWER SUPPLIES

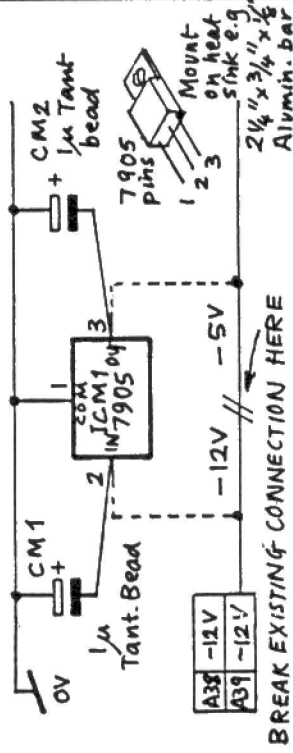


DECOUPLING CAPACITORS



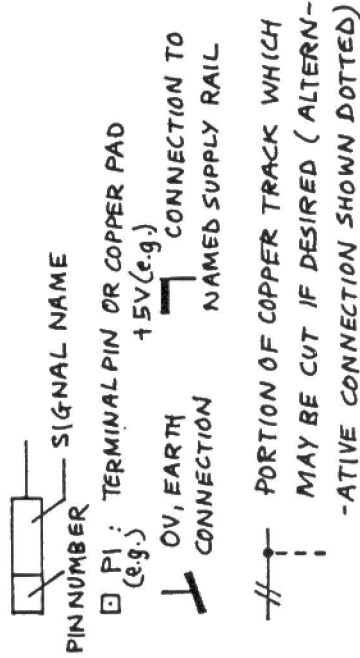
-12V TO -5V VOLTAGE REGULATOR

* IT IS STRONGLY RECOMMENDED THAT EDGE CONNECTOR PINS A38,39 BE REDEFINED AS -12V IN ORDER TO OBTAIN COMPATIBILITY WITH BOARDS DESIGNED TO THE 'IBUS' STANDARD



KEY TO SYMBOLS USED ON SHEETS 1, 2, 3

SIGNAL NAMES NOT IDENTIFIED IN MANNER BELOW ARE FOR REFERENCE ONLY
0.1" EDGE CONNECTOR:



DRAWN: DMP 18-6-80

ISSUE 1

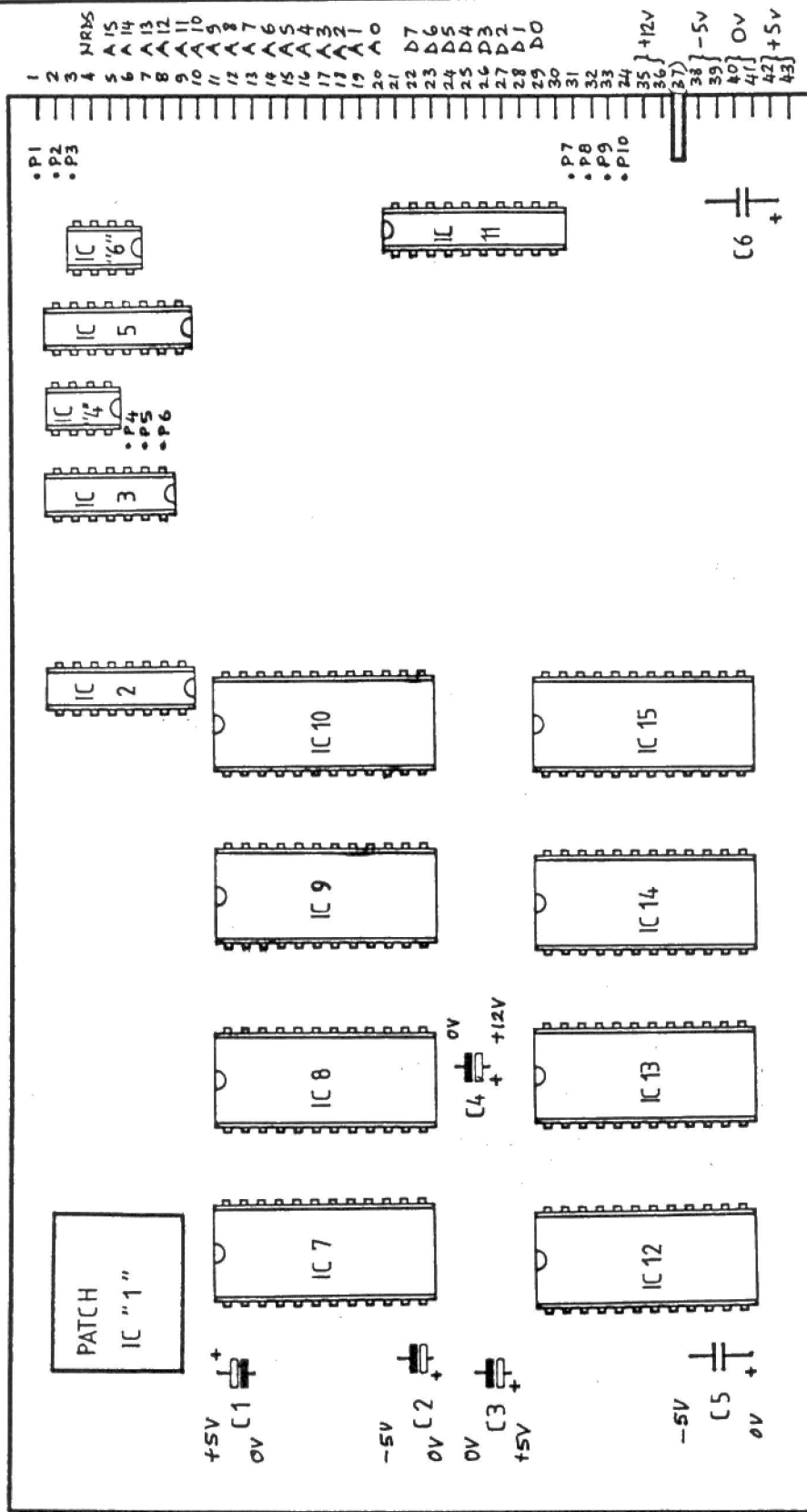
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PRM-8 CIRCUIT DIAGRAM
SECTION 3: POWER SUPPLIES AND
MISCELLANEOUS NOTES

3 OF 3

PARTS LIST

C1 100 μ /10V elec.
 C2 100 μ /16V elec.
 C3 100 μ /10V "
 C4 100 μ /16V "
 C5 100nF/30V disc.
 C6 100nF/30V "
 "IC1" "Patch" Area
 IC2 74LS139
 IC3 74LS00
 "IC4" Address Links
 IC5 74LS139
 "IC6" Address Links
 IC7-10 2708
 IC11 81LS95
 IC12-15 2708



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DRAWN JHP. 14/6/80

PRELIMINARY ASSEMBLY DIAGRAM

CHECKED DMP. 16/6/80

FOR 'KEMITRON' BOARD TYPE PRM-8

1 OF 1